# COMMUNICATION SYSTEM WITH MULTICARRIER TELEPHONY TRANSPORT

## ABSTRACT OF THE DISCLOSURE

The communication system includes a hybrid fiber/coax distribution network. A head end provides for downstream transmission of telephony and control data in a first frequency bandwidth over the hybrid fiber/coax distribution network and reception of upstream telephony and control data in a second frequency bandwidth over the hybrid fiber/coax distribution network. The head end includes a head end multicarrier modem for modulating at least downstream telephony information on a plurality of orthogonal carriers in the first frequency bandwidth and demodulating at least upstream telephony information modulated on a plurality of orthogonal carriers in the second frequency bandwidth. The head end further includes a controller operatively connected to the head end multicarrier modem for controlling transmission of the downstream telephony information and downstream control data and for controlling receipt of the upstream control data and upstream telephony information. The system further includes service units, each service unit operatively connected to the hybrid fiber/coax distribution network for upstream transmission of telephony and control data in the second frequency bandwidth and for receipt of the downstream control data and telephony in the first frequency bandwidth. Each service unit includes a service unit multicarrier modem for modulating at least the upstream telephony information on at least one carrier orthogonal at the head end terminal to another carrier in the second frequency bandwidth and for demodulating at least downstream telephony information modulated on at least a band of a plurality of orthogonal carriers in the first frequency bandwidth. Each service unit also includes a controller operatively connected to the service unit multicarrier modem for controlling the modulation of and demodulation performed by the

service unit multicarrier modem. A method of monitoring communication channels, a distributed loop method for adjusting transmission characteristics to allow for transmission of data in a multi-point to point communication system, a polyphase filter technique for providing ingress protection and a scanning method for identifying frequency bands to be used for transmission by service units are also included. Also provided is a method and apparatus for performing a Fast Fourier Transform (FFT). In one embodiment, a scalable FFT system is built using a novel dual-radix butterfly core.